9-1-1 Triage:
Implications of an Emergency Diversion Collaboration Effort

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Abstract

The overuse of emergency departments (EDs) presents a major burden to health care systems nationwide and individuals seeking services. Because health is a matter of both physical well-being and economics, it is important to consider how individuals access services and the costs associated with service use. This study examines an ED diversion collaboration implemented in Texas designed to divert lower acuity patients from EDs to more appropriate primary, urgent, dental, and in-home levels of care. Using secondary data, the study determined that approximately 29% (n = 388) of the 1,348 calls intercepted by the program were triaged to more appropriate levels of care, possibly resulting in significant cost avoidance for the hospital and collaborating partners. With over 25,000 emergency calls being made in the study area during the study period, increased diversion program resources could yield additional benefits for the community and individuals seeking care.

Keywords: 9-1-1, emergency department diversion, emergency medical services, triage, health care

Introduction

Individuals seeking care from emergency departments (EDs) for non-emergent needs represent a significant challenge to health care providers, communities, and patients themselves. Often caused by a lack of education regarding appropriate care settings (Booker, Simmonds, & Purdy, 2014; Enard & Ganelin, 2013; Khorram-Manesh, Lennquist, Hedelin, Kihlgren, & Ortenwall, 2011; Kirkby & Roberts, 2012), inappropriate ED use contributes to a myriad of problems including, but not limited to, financial burdens, longer wait times for patients, reduction in the quality of care for high-acuity patients, resource capacity concerns, and a reduction in overall emergency preparedness (Faul et al., 2012; Fay, 2015; Kadri, Harrou, Chaabane, & Tahon, 2014; Khorram-Manesh, et al., 2011).

Between 1997 and 2007, annual visits to EDs in the United States increased by 23%, approximately double the projected amount (Tang, Stein, Hsia, Maselli, & Gonzales, 2010). It is estimated, however, that 13-79% of all ED visits in the United States could be better served in less acute medical care settings (Enard & Ganelin, 2013; Faul et al., 2012). In Houston, Texas, a 2010 study found that 41% of all ED visits could have been diverted to more appropriate care settings (Enard & Ganelin, 2013). Nationally, inappropriate ED use contributes to approximately $38 billion in avoidable health care costs each year (J. G. Adams, 2013).

Inappropriate use of EDs is a concern to the social work profession as half of all social workers employed in the United States are practicing in health care-related settings (Weaver & Gjesfjeld, 2014), many with interdisciplinary health care provider teams (Gausvik, Lautar, Miller, Palleria, & Schlaudecker, 2015). In EDs, social workers provide patient navigation, education, counseling, and discharge planning services (Van Pelt, 2010). In light of current health care trends prioritizing appropriate access to care, patient engagement, and care coordination (Davis, Schoenbaum, & Audet, 2005) and the profession's holistic, person-in-environment perspective, social workers play a critical role in ensuring individuals access health care services appropriate to their needs.

Literature Review

EDs are medical facilities that specialize in acute care, providing medical services to patients requiring care within two hours. Patients in need of care within two to twenty-four hours can be defined, per the Centers for Disease Control and Prevention's classification system, as non-emergent or low-acuity patients (Fay, 2015). EDs in the United States are unique in that all patients are provided services and cannot be denied care due to being uninsured or because of an inability to pay for services (Tang et al., 2010).

Emergency Department Overutilization

The three most common reasons for ED visits in the United States are superficial and minor injuries, sprains, and upper respiratory infections (Fay, 2015). Many patients seeking emergency medical services could be categorized as low-acuity and more effectively served in less-acute medical care arenas (Faul et al., 2012). The overutilization of EDs contributes to longer wait times for patients with high-acuity care needs, wait times that have increased by 150% between 1997 and 2007, likely contributing to the increasing number of patients who leave before seeing an ED provider (Fay, 2015; Tang et al., 2010). Longer ED wait times are problematic because they are correlated with higher rates of patient aggression and agitation, drastically affecting the quality of care for high-acuity patients (Kadri et al., 2014). Additionally, longer ED wait times contribute to ED overcrowding, resource capacity constraints, and a reduction in overall emergency preparedness (Faul et al., 2012; Kadri et al, 2014; Khorram-Manesh et al., 2011). Despite these challenges, however, no policy provides standardized processes or protocols for triaging care to less acute medical care arenas (J. G. Adams, 2013; Faul et al., 2012).

With ED costs being five to 19 times higher than those associated with primary care, urgent care, or other, more appropriate medical care arenas, ED misuse creates financial burdens for both the health care system and patients themselves (Cadwallader, 2014; Hooper, 2010; Navratil-Strawn et al., 2014). The National Priorities Partnership identified preventable ED visits as one of the

top three largest contributors to fiscal waste in medical settings (Hooper, 2010), costing EDs approximately $38 billion per year (J. G. Adams, 2013). Programs that successfully reduce overutilization of EDs are net-beneficial, as the costs associated with implementing the program are significantly less than the savings generated by the program (Enard & Ganelin, 2013).

Diversion Programs

Diversion programs intend to redirect low-acuity patients from EDs and trauma centers to more appropriate levels of care including primary care clinics, urgent care clinics, dental offices, and patients' homes (Faul et al., 2012). Diversion programs implemented in the United States and the United Kingdom have received positive reviews with 90% of patients in the United States and 71 to 78% of patients in the United Kingdom reporting being "satisfied" or "very satisfied" with their care (Infinger, Studnek, Hawkins, Bagwell, & Swanson, 2013). Research in Sweden revealed that pre-hospital triaging has resulted in more affordable alternatives to care and reduced ED resource constraints (Khorram-Manesh et al., 2011). A diversion program implemented in Italy, however, was reported as an "EMS system failure" (Palma, Antonaci, Coli, & Cicolini, 2014, p. 482) because of patient under-triaging, which occurs when patients are inappropriately redirected to medical arenas that are inadequately prepared to properly address the severity of the patients' conditions (Faul et al., 2012). Though rare, under-triaging is a concern because diversion specialists may have limited time (60-120 seconds) to make their triage decisions (Palma et al., 2014).

The literature examining ED misuse and diversion programs provides an initial perspective, but shortcomings exist. A notable issue is the variability in study findings identifying the proportion of ED visits that could have been diverted to less acute medical care settings. Ranging from 13% to 79%, this disparity may be due to when and/or where studies were conducted and because of local care patterns, local policy, and the maturity of the local trauma care system (Faul et al., 2012). Another limitation is the majority of studies are not generalizable due to the use of small, non-representative samples. Finally, because ED diversion programs and collaborations are relatively new, accepted standards and protocols do not exist, a knowledge gap that forces organizations to develop their own policies and procedures, including those specifying the training, skills, and experience required of program personnel (Infinger et al., 2013). Despite this variability, however, the implementation of these programs indicates that communities are attempting to address the misuse of EDs.

Rationale and Purpose of Study

Triage programs, a relatively new approach to address inappropriate ED use, have demonstrated an ability to efficiently manage ED resources while linking patients to appropriate care. The extant literature investigating these programs, however, is minimal, and studies have largely included non-domestic programs. Given these limitations, additional research examining domestic diversion programs is needed, ideally including large, representative samples. This study seeks to fill this gap in the current knowledge base by evaluating a domestic 911 diversion program located in a large urban area. The study seeks to determine the proportion of 911 calls able to be diverted to a lower level of care between January and December 2015.

Method

This study examined a diversion program developed by a hospital and an emergency medical service provider located in Texas. The purpose of the program was to properly route individuals calling the local 911 service for a medical emergency to the appropriate level of care. An explicit goal of the program was to reduce inappropriate ED utilization. Program resources initially included four full-time nurse diversion specialists who triaged intercepted 911 calls between the hours of 8:00am and 5:00pm, Monday through Friday. In July, a part-time nurse diversion specialist was added to the program, augmenting existing daytime coverage. In practice, emergency calls were initially answered by a 911 dispatcher. When calls were medical in nature and a diversion specialist was available, the dispatcher would redirect the call to a diversion specialist. The diversion specialist would then use a triage algorithm to determine the most appropriate medical care setting. Information gathered during the triage process included date and time of call, caller's name, date of birth, sex, and presenting crises/symptoms. Based on the results of the triage process, the diversion specialist would then send an ambulance for emergency transport to the ED, facilitate contact with the patient's primary care physician, make an appointment for the patient to be seen in the near future, send non-emergency transportation for care at a less acute medical care arena, or provide advice for in-home care. In addition to redirecting calls, it was expected that diversion specialists educate patients on the differences between emergent and non-emergent calls and provide alternative resources to better meet patient needs (Wallerstein & Bernstein, 1988), ultimately freeing ambulatory and ED resources for high-acuity patient needs.

Participants, Data Collection, and Procedures

This study included adult-initiated (over the age of 18) calls for emergency services made between January and December 2015 that were intercepted by a diversion specialist affiliated with the diversion collaboration program. De-identified, secondary data were obtained from the participating hospital's electronic record system used to store information gathered by the diversion specialists. Specific variables for the study included: (1) date of call and (2) whether or not the patient was referred to the ED. Demographic information regarding participant age, gender, time of call and originating zip code was also requested, but the hospital system only provided age of the caller due to privacy concerns. Study approval was obtained from the hospital system and the Texas Christian University Institutional Review Board. Statistical analyses were completed using IBM SPSS statistics, version 23. Demographic data were summarized with numbers, percentages, means and standard deviations. Chi-square tests were used to compare categorical variables. Statistical significance level was set at $\alpha = .05$.

Results

Of all the calls made for emergency services ($N = 25{,}716$), 6% ($n = 1{,}500$) were intercepted by a diversion specialist. Of these 1,500 calls, 152 child-related calls were excluded, leaving 1,348 calls for study analyses. Individuals making these calls averaged 50 years old ($SD = 19$ years) and ranged in age between 18 and 110 years old. Overall, just less than one-third (29%) of intercepted calls were triaged to a lower acuity care arena in 2015. Table 1 presents a breakdown of intercepted calls and triaged calls based on participant age.

During data analysis, triaged calls were dichotomized based on participant mean age (between 18 and 50 or over 50). A statistically significantly higher proportion of successfully triaged calls were initiated by those between the ages of 18 and 50, compared to those over 50 years old, 35.3% vs. 22.8%; $\chi^2(1, N = 1335) = 25.26, p < .001$, based on chi square analyses Secondary analyses examined the number of calls intercepted and diverted over the course of the study period. The number of intercepted calls increased as 2015 progressed, with only 17% (n = 233) occurring in the first quarter and 38% (n = 507) occurring in the last quarter. No statistically significant differences were found, however, when using chi-square analyses to compare the proportion of intercepted calls triaged on monthly or quarterly basis over the course of the study. Table 2 provides a comparison of intercepted and triaged calls over the study period.

Table 1. Participants by age

	Intercepted calls		Triaged calls	
	n	%	*n*	%
Age				
18-32	358	27	122	31
33-46	288	21	108	28
47-60	414	31	106	27
61-74	194	14	44	11
75-90	76	6	8	< 1
91 +	5	< 1	0	0
Unknown	13	< 1	0	0
Total	1348	100	388	29

Discussion

The purpose of this exploratory study was to examine an innovative ED diversion program and determine the proportion of 911 calls triaged to a lower level of care. The main finding of the study, that approximately 29% of intercepted calls were diverted to a lower level of care, is consistent with prior studies identifying that between 13 and 79% of all ED visits in the United States could be diverted to less acute care settings (Enard & Ganelin, 2013; Faul et al., 2012). Diversion programs, like the one examined in this study, have the potential to link patients with appropriate care while avoiding higher costs associated with ED service use. For health care systems and communities, these types of programs have the potential to help relieve the strain experienced by overburdened EDs while helping to reduce unnecessary health care costs.

Another relevant finding is that no statistically significant differences were found when comparing the proportion of calls diverted over the course of the 12-month study period on a monthly (23.0% – 38.5%) or quarterly (27.8% – 31.3%) basis. The statistical consistency of this diversion rate is noteworthy given the influence of temporal events on health care use including new or changing legislation affecting access to and public attitudes towards health care (Shaw, Asomugha, Conway, & Rein, 2014), seasonal changes in health (Ballester, Lowe, Diggle, & Rodo, 2016) and natural disasters (Callaghan et al., 2007).

Table 2. Comparison of calls by age, month, and quarter

	Triaged		Not triaged		Test statistic
	n	%	*n*	%	
Age***					$\chi^2(1) = 25.26, p < .001$
18-50	237	35.3	435	64.7	
Over 50	151	22.8	512	77.2	
Month					$\chi^2(11) = 13.49, p = .26$
Jan	20	23	67	77	
Feb	23	38.3	37	61.7	
Mar	19	25	57	75	
Apr	11	28.2	28	71.8	
May	40	38.5	64	61.5	
June	32	26.2	90	73.8	
July	33	34.7	62	65.3	
Aug	34	26.2	96	73.8	
Sept	33	25.8	95	74.2	
Oct	53	28.3	134	71.7	
Nov	51	30.5	116	69.5	
Dec	39	25.5	114	74.5	
Quarter					$\chi^2(3) = 1.06, p = .79$
1st	62	27.8	161	72.2	
2nd	83	31.3	182	68.7	
3rd	100	28.3	253	71.7	
4th	143	28.2	364	71.8	

Note. *** indicates $p < .001$.

The number of calls intercepted by program staff increased as 2015 progressed, most likely due to a part-time diversion specialist being added to the program in July 2015. As the number of intercepted calls increases, it can be assumed the number of diverted calls would increase as well. With only 6% of all 911 calls being intercepted but with 29% of those calls being diverted, it appears the program could add diversion specialists with the reasonable expectation that program benefits would continue to accrue. One especially efficient way to target existing or new program resources would be to deploy diversion specialists during peak 911 call periods including weekends and holidays, when 911 calls can increase by between 30% and 56% (DaGar, Sahin, Yilmaz, & Durak, 2014; Jones et al., 2008).

Ethical concerns and program design and implementation challenges could complicate local efforts to develop 911 diversion programs. For social workers, a prime ethical concern is that diversion specialists, in some cases, undermine self-determination as they override patients' self-prescribed need for acute care (National Association of Social Workers, 2008). To empower patients to make informed health care decisions, diversion specialists should collaboratively provide education and resources while respecting the patient's right to seek ED services, regardless of the triage determination. A program design and implementation concern is that policies and procedures specifying the qualifications and training of diversion program staff vary widely between diversion programs. This variability makes it difficult to identify best practices when developing new programs, possibly undermining program efficacy and placing patients at

risk for under-triaging. Until diversion program-specific best practices are identified through ongoing research, programs should rely on established clinical foundations and qualifications (i.e., BSN, MSN, LMSW, or LCSW) to critically assess patient needs (B. L. Adams, 1999).

Study Limitations

While this study offers a valuable perspective on an innovative 911 diversion program, the study is not without limitations. Two notable limitations are that the unique setting and nature of the 911 program examined in the study limit the generalizability of the findings and the few variables included in the study severely restricted data analysis. Even the inclusion of basic demographic variables such as race, gender, and ethnicity would have provided a more nuanced perspective on the data, strengthening the study. Additionally, the inclusion of a unique participant identifier would have allowed the study to provide an assessment of repeat 911 callers among calls diverted and those triaged to a lower level of care. While clearly not representative of all calls made to 911 during the study period, this assessment would still seem to offer some utility. Finally, while the study determined whether the caller was referred to the ED or triaged to a lower level of care, it did not detail whether the caller was provided in-home care or sent to an urgent, primary, or dental clinic. Further, the study was unable to determine whether the caller actually received this care, an important consideration. Without having access to these variables, the researcher was unable to calculate the exact amount of fiscal savings resulting from calls being diverted.

Recommendations and Conclusion

Given the unique nature of this ED diversion program and, therefore, this study, it is suggested that ED diversion programs implemented elsewhere similarly evaluate their activities, adding to the body of knowledge regarding these novel community interventions. As noted earlier, research should also include children in order to provide a more comprehensive picture of diversion program activities. An especially critical aspect of future studies is to determine whether individuals triaged to lower levels of care actually obtained this care in order to accurately calculate cost savings. Additionally, future research should examine how individuals continue to seek ED services after being diverted to a lower level of care. Do they continue to seek care for the same complaint or do they seek care for new complaints and conditions?

Ultimately, ED diversion programs appear promising as a way for communities to efficiently manage health care resources while ensuring individuals access needed care. While additional study is required, it seems reasonable to expect that adding diversion specialists to the diversion program examined during this study would continue to yield positive benefits for patients, the hospital system, and the community. Additionally, with younger adults being statistically significantly more likely to be triaged to a lower level of care than older adults, education promoting the appropriate use of health care resources for this subpopulation could augment the efforts of the ED diversion program.

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